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Inflationary evolution of the Universe within the framework of the modified JBD theory

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Certain conceptual difficulties arising in the construction of the cosmological evolution of the Universe (horizon and "flatness" problems), in fact, do not affect the Standard Model tested by known observations. They allow to determine reasonable initial conditions for classical Cosmology, the inflationary process, which transforms the exponential expansion near the Planck time to the power-law one.It is significant that while different areas of space, being on the "distance" H_0^{-1} (H_0 is the corresponding Hubble parameter) stop to interact, the "memory" on the previous connection remains that solves the horizon problem in the inflationary model. The "flatness" problem is solved in the case where during some time period the equation of state is given by $p = -\varepsilon$. In this case, during 70 Hubble times "flat" Universe is formed with accuracy 10^{-60}. Simultaneously the horizon problem is solved. This exotic equation of state occurs naturally in all sustainable models. In particular, the dynamics of a scalar field, under very natural assumptions, leads to a satisfactory inflationary expansion. In this work, within the framework of various conformal representations of the modified Jordan - Brans - Dicke theory, inflationary solutions are constructed by taking into account a specific scalar field for particular de Sitter models in which the Universe is filled by the vacuum. We consider the inflationary expansion from the Planck time till the beginning of the hot stage in the case of a minimally coupled scalar field. In the first model we take a massless scalar field and in the second one - a conformally coupled scalar field. In both cases there is a specific cosmological scalar that is an analogous of the variable cosmological constant.

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